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References. Tables.

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EFFECTS OF DIFFERENT INTERMITTENT LIGHT PATTERNS ON BODY WEIGHT GAIN, MORTALITY AND FOOD CONVERSION RATIO OF BROILER- CHICKS

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SUMMARY

An experiment using one day-old mixed-sex broiler chicks of 55-60 g was designed to show the effects of various lighting programs of photo period manipulations. Four hundred and eighty five broiler chicks were randomly distributed into three groups. Each pen was stocked by 160-165 chicks. All birds received continuous light of 23 hours and 30 min. from day old to 10 days of age. The control group (A) continued to receive the same program throughout the 7 weeks of raising. At 3 weeks of age, one of the treatments (group B) was exposed to alternated phases of 2 hours light (2L) and 4 hours (4D) darkness. The third treatment (group C) received semi-continuous light schedule (18 hours of light and 6 hours of darkness in 24 hours) during the second decade of life, and was switched into another intermittent light schedule consisting of six periods equally spaced throughout 24 hours. (2L: 2D) beginning with the third decade of age to the end of the trial. Intermittent lighting (IL) showed favorable effects on body weight and FCR. Semi continuous lighting schedule of 18L:6D after 10 days of continuons lighting followed by either 2L:2D or 3L:2D at day 20 of age is more profitable compared to continuous lighting program in broiler chickens raising, giving more body weight, improved FCR and saving electricity up to 33 %.

INTRODUCTION

Intermittent light patterns can be of great value on broiler performance in reducing the effects of heat stress, leg defects, downgrading, abdominal fat

levels, electricity costs, and improving growth rate and feed efficiency (WEBSTER, 1994; GORDON, 1994) of broiler performance. One of the problems in detemining the optimal length of time of light and darkness is to determine how long it takes a chick to consume enough feed for rapid growth and how long an inactive period is necessary before the bird will actively feed when given the opportunity. BARROTT and PRINGLE (1951) concluded that chicks ate as much as they desired within one hour and then would not actively feed for another three to four hours. GORE *et al.* (1969) indicated that 15 minutes of light every one or two hours were sufficient for feeding and the following 45 or 105 minutes of darkness were sufficient intervals before resumption of feeding. Intermittent light with several cycles or periods of light and darkness per day has given inconsistent, equal or less desirable results when contrasted with continuous light or with one period of light and one period of darkness per day with continuous light or with one period of light and one period of darkness per day (BANKS, 1979; GORE *et al.*, 1969). Favorable results on Intermittent lighting have been reported by SAVORY (1976), SYKES (1983) and CLASSEN (1992).

The most important and dangerous problem facing the broiler production in Lebanon is the high rate of feed consomption under the usual condition of continuous lighting and its effects on feed conversion. Intermittent light could be used to save the quantity of food in order to increase the conversion rate and consequently to reduce the costs of production. The primary objective of this work is to examine the effect of various intermittent lighting programs with prolonged and semi continuous periods of light on broiler performance such as livability, live body weight and pattern of feed consomption as well as food conversion ratio.

MATERIALS AND METHODS

An experiment using one day-old mixed-sex broiler chicks of 55-60 g was designed to show the effects of various lighting programs of photo period manipulations. The trial was conducted under traditional ways of raising broiler chicks in closed windowless houses with automatic feeders and watering with a density of 0.1 m^2 of floor space per bird. Chicks were raised in an environmentally controlled poultry house with three light controlled chambers on 36 m^2 area for a period of seven weeks and fed corn-soybean meal diets formulated to meet National Research Council (1984) requirements. All birds

were floor reared on wood shavings under warm room conditions. Temperature and ventilation were regulated through a control panel. Heat for brooding was supplied by butane gas which was located above the chicks. Approximate room temperatures, were between 19 and 30°C. Automatic timers were used to schedule the lighting patterns. Light intensity from incandescent bulbs were measured by luxmeter (photometer) at several locations about 15 cm above the litter averaged 12 lux. A vaccination program was strictly executed against all known diseases in the area through out the experiments. All birds of different groups received a commercial broiler starter crumbles the first 30 days and grower-finisher crumbles the remaining period of rearing. The dependent variables were mortality rate, live-body weight, weight gain rates and feed conversion ratios. Weights were taken individually at 10-day intervals in all experimental groups and food consomption was tabulated too. Mortality was recorded daily. All chicks that died were submitted to official veterinary laboratory for autopsy and determination of probable cause of death.

Four hundred and eighty five broiler chicks were randomly distributed into three groups. Each pen was stocked by 160-165 chicks. All birds received continuons light of 23 hours and 30 min. from day old to 10 days of age. The control group (A) continued to receive the same program throughout the 7 weeks of raising. At 3 weeks of age, one of the treatments (group B) was exposed to alternated phases of 2 hours light (2L) and 4 hours (4D) darkness. The third treatment (group C) reccived semi-continuous light schedule (18 hours of light and 6 hours of darkness in 24 hours) during the second decade of life, and was switched into another intermittent light schedule consisting of six periods equally spaced throughout 24 hours. (2L: 2D) beginning with the third decade of age to the end of the trial.

RESULTS AND DISCUSSION

Restricting the length of time that feed is available gives improved feed conversion under some conditions (MCCARTNEY and BROWN, 1977; REECE and LOTT, 1986). The broiler industry has used many regimes to obtain this improved feed efficiency. Flock management is more complicated with meal feeding. One factor that must be addressed when using meal feeding is gut clearance before processing. Over consomption of feed, can hinder gut clearance (MAY and LOTT, 1994). However, this problem can be overcome by continuous access to feed with constant lighting for several days before

processing (MAY and LOTT, 1994). Any factor that causes over consomption of feed may be detrimental to gut clearance. Anticipating feeding may be defined as the increased consomption of feed before a recurring period of feed unavailability. Anticipatory feeding occurs before darkness in broilers (SAVORY, 1976) but does not occur in broilers provided continuous, constant intensity light (MAY and LOTT, 1994).

Chicks of all groups at the age of 10 days exhibited the same body weight (~ 150 g), since they were raised in the same conditions. Chicks after that received semicontinuous light during the second decade. Group C significantly surpassed other groups that were left on the same regime giving an average body weight of 486 g and 460 g respectively. Beginning from the 3rd decade the three groups received different regimes of light. Data illustrated in Table 1 show that, chicks that were switched into another intermittent light manifested significantly greater body weight at all life stages. While no significant changes were noticed between groups A and B.

Feed conversion ratio (FCR) was slightly imoroved in group of chicks subjected to intermittent light (C) compared to their continuous lighting counter parts. It averaged 2.058, 2.136 and 2.184 in groups C, B and A respectively (Table 1). No significant differences in body weight and rate beween A and B were noticed at all at ages. Chicks of the second and fourth decades, while in the first and third decades they were equivalent to other groups, and significantly less at the age of 47 days (Table 2).

Similar results were obtained by HOOPPAW and GOODMAN (1976), MORGAN (1983), BUYSE (1993), ZAKARIA (1985), CLASSEN and RIDELL (1989).

CONCLUSIONS

Intermittent lighting (IL) showed favorable effects on body weight and FCR. Semi continuous lighting schedule of 18L:6D after 10 days of continuous lighting followed by either 2L:2D or 3L:2D at day 20 of age is more profitable compared to continuous lighting program in broiler chickens raising, giving more body weight, improved FCR and saving electricity up to 33 %.

Table 1. The effect of intermittent light on live body weight (g) and its rate (%), and food conversion ratio (FCR) of broilers, g

Age, days	A (control)	B	C
10	150.13±0.47[a]	150.00±0.89[a]	149.06±1.06[a]
20	460.00±0.77[a]	460.62±3.04[a]	485.94±1.45[b]
30	727.38±4.29[a]	731.37±3.04[a]	752.87±3.03[b]
40	1431.57±3.81[a]	1436.56±2.27[a]	1590.31±2.19[b]
47	1789.37±2.13[a]	1789.56±1.04[a]	1830.13±2.76[b]
Feed conversion ratio at 47 days	2.184±0.236[a]	2.136±0.223[a]	2.058±0.228[a]

Means ± Standard error

[ab] Means in a row wtith different superscripts were significantly different ($P < 0.05$).

Table 2. The effect of intermittent light on body weight gain (g) and its rate (%) of broilers, g

Age, days	A (control)	B	C
0-10	150.13	150.00	149.06
11-20	309.87	310.62	336.88
21-30	267.38	270.75	266.93
31-40	704.19	705.19	737.44
41-47	357.80	353.00	339.82

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